Challenges

Sentiment Analysis is an umbrella term for large number of emotions and affect related discoveries or tasks, each of which has their own distinct challenges. The sub-sections provide an overview of some of them.

1. Sentiment at different text granularities

These days Sentiment can be determined from various mediums: from sentiment associations of words and phrases; to sentiment of sentences, SMS messages, chat messages, and tweets; to sentiment in product reviews, blog posts, and whole documents. Modals and negation impact affect of the sentence without them having strong sentiment associations. For example*, The war has created millions of refugees.*

Here, the sentence is neutral for a negative situation from the message producer’s perspective.

It is possible that a particular text shows a particular feeling without use of any overt and explicit markers. For example, *Another Monday, another week, working my tail off.* This clearly conveys sense of frustration without use of any highly specific words for showing frustration.

Many times sentiment in sentence is judged on the basis of component words in it but the valence of a sentence is not simply the sum of the polarities of its constituent words.

With increasing number of social media websites, there is also an increasing trend of using non-standard texts.

For example, consider

*misspellings - parlament*

*creatively spelled words - luv hashtagged words - #luvumom*

*abbreviations - tbh, af, f9, lmao*

1. Detecting sentiment of writer, reader and other entities

On just having a look at a sentence, it may seem unambiguous but looked closely, it is easy to identify if the sentiment is of the writer, reader of any other entity. Many times, it is usually unclear if the sentiment in the text is same as the sentiment of the speaker. It may refer to the emotions without explicitly or implicitly referring to the speaker’s view.

For example, consider

*My friend always keeps on complaining how hectic her schedule is.*

The sentiment in the text is definitely negative (frustration and complaint), but it is not of the speaker itself. It is of someone the speaker knows.

Another example, consider

*Bob: The pop star suffered a fatal overdose of heroine.*

This text describes a negative event (death of a person), but it cannot be concluded that the speaker, Bob, is personally saddened by this negative event. It is possible that Bob is a news reporter and merely describing the event.

1. Outlook Detection

By this term, it means that it should be identifiable from text whether the speaker is in favor, against or neutral towards the subject of the text.

For example, consider

*Congratulations! You broke my $1000 glass!*

The speaker is not actually happy and neither is the speaker congratulating; the tone of the text is sarcastic.

Hence as seen, it is difficult to interpret creative uses of language like sarcasm, irony, humour, metaphor, idiomatic and figurative language.

New research in fields like social media texts, and approaches that combine traditional sentiment analysis with relation extraction can significantly impact in improving the current form of automatic outlook detection.

1. Detecting affect and emotions

Most machine learning algorithms for affect analysis require large amounts of training data because there are numerous affect categories like happiness, sadness, excitement, disgust, frustration etc. Moreover, these affect categories can be overlapping.

For example, consider

*Wow! I am so happy for you.*

This text can be categorized in happiness as well as excitement category.

Moreover, to get a good F-score and higher accuracy, it is important to have huge amounts of training data.

Many a times, the text can have different affect depending upon its sense and context.

For example, consider,

*Mary hugged her daughter before going to work.*

This text is quite emotional whereas,

*The pipeline hugged the state border.* This text is rather unemotional.

But both of the texts have the presence of the same word, that is, ‘hugged’. Therefore, this is for sure that the affect and emotion of the text cannot be decided alone on the polarities of words occurring in it.

1. Named entity recognition and anaphora resolution

*Liar, Liar is a good watch.*

In this text, the speaker is not actually talking about he being a liar or someone else being a liar and neither is he saying that being a liar is a good thing; he is simply talking about the movie ‘Liar, Liar’.

The classifier has to be trained to recognize named entities like movies, places, idioms etc.

It should also be able to resolve what a pronoun, or a noun phrase refers to.

*We watched the movie and went to dinner; it was awful.*

In this text, the classifier should be able to clearly distinguish if it refers to the movie or the dinner.

Researchers are trying to address these challenges and come up with solutions to build a better classifier in each iteration. We will try to analyze these challenges in later section.

Critical Analysis

Challenges

Various challenges described in the challenges section prevent from realizing the true potential of sentiment analysis fully in real life world. Although it is being used in day to day applications these days, be it social media or financial decisions but it has a lot more potential to transform machine learning immensely.

One common solution to all the challenges is human intervention. Because ‘machines do analytics, humans do analysis’, as correctly quoted by Anjali Lai, Analyst at Forrester Research. Humans apply prior knowledge they have acquired from their experience because they never learn in isolation but machines learn in isolation because it is the humans who feed them data. So, this blended approach can work really well in solving challenges in which the machines cannot actually recognize the stance of the text like sarcasm, irony, idioms and so on and where the machines cannot differentiate in the sentiment of the text. It is important to keep humans in the loop for the continuous training of the machines and

classifiers.

Adopting a multi method research plan can aid in realizing why a group of users has a particular sentiment at that particular point. Most of the times, sentiment analysis takes into account only the sentiment at a specific point in time. For example, these days there is a lot of negative air around United Airlines. People are regularly bashing and speaking and expressing their opinions not in favor of the airlines. But, when looked closely at the previous series of events it is clear that they have done something which has upset their customers. They were under the fire recently for misbehaving with and beating an Asian passenger.

For better sentiment analysis, previous string of events happened as well as the demographic group among which it happened should be considered. Hence, it is suggested that conducting surveys along with sentiment analysis helps explain rationales and match sentiment data to the relevant audience targets.

All too often in Machine Learning, people extract data which prove their hypothesis theory. But, data should be approached with an open mind.

It is possible that a person tweets or write negative reviews without use of any specific negative words whereas another person writes a positive review using negation. If the classifier will search for some specific negative words, it will simply discard the former and predict the sentiment of the latter as negative since it uses negation.

To get a hold of such kind of problem, it is important to observe large training sets and explore in depths the sound of the text and then deciding upon the sentiment, instead of simply searching for specific words or markers in the text. No particular data point is necessarily relevant. It’s the aggregate that matters.

Moreover, humans do not have any control over their sentiments. They are fickle-minded by nature. Since sentiments of a person change from time-to-time, sentiment analysis systems should be made such that they can adapt themselves dynamically. This can take at least 2-3 decades because it is an incredibly difficult issue. It is important to take an incredibly sophisticated and rigorous approach to solve this issue.

Conclusion and Future scope

This report presents an overview of what exactly sentiment discovery and analysis means, what are the its various applications, approaches and challenges.

Information from micro-blogs, blogs and forums as well as news source, is widely used in sentiment analysis recently. This information plays a great role in expressing people’s emotions, or opinions about a certain topic or product. With the explosive use of social media websites like Facebook, Twitter, Instagram etc. it is easy to get day to day, in fact second to second update about what a person is upto, what are his opinions about a particular movie or what is his review of a new restaurant in town.

For example, consider, some users review a restaurant negatively due to some personal enmity, but still it creates a ‘buzz’ about the restaurant.

This indicates even if illegitimate users get through, sentiment analysis systems can still be valuable to the consumers.

Also, there is continual research going on to improvise the methods of sentiment analysis. All of the methods that are discussed in this report has some pros and cons. For effective sentiment analysis, it is important to have a good system, or in other words, a good classifier, which can analyze and extract important information from the training data, i.e. give better F-scores.

The future scope of sentiment analysis is really bright. This is a discovery that is going to change the future of Machine Learning and Artificial Intelligence tremendously.

Of course there is still a lot to do in this sphere because this is still in an experimental phase in many industries.